

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, Colorado 80527-2400

PATENT APPLICATION  
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IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Kurt Ulmer et al.

Confirmation No.: 2572

Application No.: 10/674,053

Examiner: LEWIS, Ben

Filing Date: September 29, 2003

Group Art Unit: 1795

Title: Fuel Cell Modulation and Temperature Control

Mail Stop Appeal Brief - Patents  
Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL OF REPLY BRIEF

Transmitted herewith is the Reply Brief with respect to the Examiner's Answer mailed on April 16, 2009.

This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly stated new ground rejection.)

No fee is required for filing of this Reply Brief.

If any fees are required please charge Deposit Account 08-2025.

Respectfully submitted,

Kurt Ulmer et al.

By: /Steven L. Nichols/

Steven L. Nichols

Attorney/Agent for Applicant(s)

Reg No. : 40,326

Date : June 16, 2009

Telephone : 801-572-8066

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Kurt Ulmer et al.  
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REPLY BRIEF

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Sir:

This is a Reply Brief under Rule 41.41 (37 C.F.R) in response to the Examiner's Answer of **April 16, 2009** (the "Examiner's Answer" or the "Answer"). In Section 10, the Answer contains a response to some of the arguments made in Appellant's brief. Appellant now responds to the Examiner's Answer as follows.

**Status of Claims**

Claims 2, 8-23, 26, and 27 were previously canceled without prejudice or disclaimer. Further, claims 4, 31, 37, and 43 were canceled in the previous response without prejudice or disclaimer. Claims 1, 3, 5-7, 24, 25, 28-30, 32-36, 38-42, 44, and 45 are pending in the application and stand finally rejected. Accordingly, Appellant appeals from the final rejection of claims 1, 3, 5-7, 24, 25, 28-30, 32-36, 38-42, 44, and 45, which claims are presented in the Appendix of the Brief.

**Grounds of Rejection to be Reviewed on Appeal**

The Answer maintains the following single rejection.

- (1) Claims 1, 3, 5-7, 24, 25, 28-30, 32-36, 38-42, 44, and 45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the single reference, U.S. Patent Application Publication No. 2003/0008184 to Ballantine et al. (hereinafter “Ballantine”)

According, Appellant hereby requests review of this rejection in the present appeal.

**Argument**

(1) Claims 1, 3, 5-7, 24, 25, 28-30, 32-36, 38-42, 44, and 45 are patentable over Ballantine:

Claims 1, 28, 34, and 40:

Claim 1 recites:

A fuel cell system, configured to control temperature of individual fuel cells of a plurality of fuel cells by regulating serial vs. parallel configuration of the plurality of fuel cells within the system, the system comprising:

first and second fuel cells of the plurality of fuel cells capable of providing an electrical output; and

a controller configured for regulating temperature of the fuel cell system by controlling serial vs. parallel configuration of the first and second fuel cells, wherein the controller is configured to identify whether more or less heat is required by the fuel cell system,

*wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration, and*

wherein the controller is in communication with:

a switch circuit comprising one or more switches for arranging the electrical output of the first fuel cell and the electrical output of the second fuel cell in parallel or series; and

*a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell and providing a signal to the controller;*

*wherein the controller utilizes the switch circuit to switch to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required.*

(Emphasis added).

Claims 28, 34, and 40 contain similar recitations, and the below analysis of claim 1 applies to these claims in a similar manner. (See e.g. Appeal Brief, pp. 18-20). In contrast, Ballantine utterly fails to teach or suggest this subject matter.

As Appellant has previously noted, Ballantine teaches the opposite of claims 1, 28, 34, and 40. Ballantine teaches “generating a heat demand signal when the thermal parameter of the heat sink is below a predetermined level; and . . . selectively connecting at least two

fuel cells in the fuel cell stack *in parallel in response to the heat demand signal.*

(Ballantine, para. [0015]) (emphasis added). Similar language is contained in paragraphs [0090], [0095], [0097], [0129], and [0130] of Ballantine as well.

In response, the Answer concedes that “Ballantine et al. do not specifically teach switching to a more serial [configuration] if more heat is required and switching to a more parallel configuration if less heat is required.” (Answer, p. 4). The Answer then argues the following:

However, in the system of Ballantine et al. all the elements are present therefore it would have been obvious [to] one of ordinary skill in the art at the time the invention was made to switch the fuel cell system of Ballantine et al. in the same manner as claimed by applicant since applicant claimed an apparatus [and] all the elements of applicant’s claimed apparatus are present in the fuel cell system of Ballantine et al.

(*Id.*).

Appellant respectfully disagrees with the Examiner. In direct contrast to the teachings of Ballantine, claim 1 recites a controller that *increases heat production* by increasing fuel consumption by switching to a more *serial configuration* and *decreases heat production* by decreasing fuel consumption by switching to a more *parallel configuration*.

Consequently, Ballantine clearly *teaches away* from claim 1 by stating the exact opposite of that which is claimed. Appellant notes that a reference must be considered for all it teaches, including disclosures that teach away from the invention as well as disclosures that point toward the invention. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.* 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985).

Further, Appellant wishes to point out that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). MPEP §

2143.01. Here, the Examiner seeks to modify Ballantine in such a way as to fundamentally change the principle of operation of the prior art invention. Specifically, the Examiner seeks to modify Ballantine such that the invention of Ballantine functions in the exact opposite manner as the Ballantine reference demands.

In other words, the Examiner seeks to modify the invention of Ballantine such that a number of fuel cells are switched to a more serial configuration if more heat is required, and switched to a more parallel configuration if less heat is required. As amply demonstrated in the Appeal Brief, the Ballantine clearly requires that the fuel cells be connected in parallel in response to a heat demand signal (e.g. in order to increase heat within a system). (Appeal Brief, pp. 13-14). This is the case throughout the Ballantine reference. (See e.g. Ballantine, paras. [0015], [0090], [0095], [0097], [0129], and [0130]). Thus, because the proposed modification of Ballantine would change the principle of operation of the Ballantine invention, the teachings of Ballantine are not sufficient to render claim 1 obvious.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a fuel cell system, comprising a controller configured for regulating temperature of the fuel cell system, wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration.

The differences between the cited prior art and the claimed subject matter are significant because such a configuration allows a fuel cell system to operate more efficiently.

Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and Graham.

Finally, claim 1 recites a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell. The Answer states that “Applicant has not claimed the temperature of the fuel cells are ‘directly measured,’” and that “Examiner interpreted the temperature measurement to be either direct or indirect since there is no indication in the claim language of the temperature measurement being solely direct.”

(Answer, p. 18).

However, the Answer concedes that Ballantine teaches, “that a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat) . . . .” (Answer, p. 4). Thus, Ballantine teaches detecting the temperature of a heat sink.

In contrast, claim 1 recites a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell. This subject matter is clearly outside the teachings of Ballantine.

Again, under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a temperature measurement circuit capable of measuring the temperature of a first fuel cell or a second fuel cell.

The differences between the cited prior art and the claimed subject matter are significant because direct measurement of a fuel cell allows for more precise measurements of heat transfer as opposed to measuring heat that has been transferred through one or more mediums. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and Graham.

Claims 24 and 25:

Claim 24 recites:

A fuel cell system comprising:  
means for supplying an excess amount of fuel to a multiple fuel cell system;  
*means for regulating the temperature of the fuel cell system by controlling serial vs. parallel configuration of at least two fuel cells within the fuel cell system*, wherein the means for regulating the temperature identifies whether more or less heat is required by the fuel cell system;  
means for switching at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement; and  
means for producing heat from at least some of the excess amount of fuel, *wherein the means for producing heat switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system.*

(Emphasis added).

Similarly, claim 25 recites:

A fuel cell system comprising:  
means for supplying a substantially constant amount of fuel to a multiple fuel cell system;  
means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement and maintaining a constant power output in each arrangement, *wherein the means for switching switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system;*  
means for increasing EMF efficiency; and  
means for reducing fuel efficiency.

(Emphasis added).

In contrast, as demonstrate above, Ballantine does not teach or suggest a fuel cell system like that recited in claims 24 and 25 in which the fuel cell system switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system. To the contrary, Ballantine teaches away from this subject matter and actually teaches the exact opposite.

Further, because the proposed modification of Ballantine would change the principle of operation of the Ballantine invention, the teachings of Ballantine are not sufficient to render claim 1 obvious.

Again, under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a fuel cell system like that recited in claims 24 and 25 in which the fuel cell system switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system.

The differences between the cited prior art and the claimed subject matter are significant because such a configuration allows a fuel cell system to operate more efficiently. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and *Graham*.

Claims 6, 7, 38, and 39:

The rejection of claims 6, 7, 38, and 39 should not be sustained for at least the same reasons given above in favor of the patentability of independent claims 1 and 34, respectively. Further, the Answer does not address the arguments presented in the Appeal Brief in connection with claims 6, 7, 38, and 39. Therefore, Appellant wishes to refer the Board to those arguments presented in the Appeal Brief in favor of the patentability of claims 6, 7, 38, and 39. (Appeal Brief, pp. 24-27).

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of September 22, 2008 is respectfully requested.

Respectfully submitted,

DATE: June 16, 2009

/Steven L. Nichols/  
Steven L. Nichols  
Registration No. 40,326

Steven L. Nichols, Esq.  
Managing Partner, Utah Office  
Rader Fishman & Grauer PLLC  
River Park Corporate Center One  
10653 S. River Front Parkway, Suite 150  
South Jordan, Utah 84095  
(801) 572-8066  
(801) 572-7666 (fax)